



SEPTEMBER 21, 2020

# STORMWATER MASTER PLAN UPDATE

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CITY OF INDIANOLA

- Desire to efficiently utilize available stormwater funding.
- Process/Schedule/Budget:
  - Storm sewer data collection.
  - Stormwater modeling program.
  - Stream assessments.
- Assessment of staff and citizen areas of concern.
- Conclusions:
  - Keeping existing infrastructure in good repair.
  - Prioritize needed improvements.
  - Existing database of knowledge was not sufficient.

# REVIEW OF PAST ACCOMPLISHMENTS

Year	Project Name	Project Description
2017	2017 Drainage Repairs <ul style="list-style-type: none"> <li>• South Howard/South Buxton</li> <li>• Kennedy Street</li> </ul>	<ul style="list-style-type: none"> <li>• Storm Sewer Repairs</li> </ul>
2018	Capital Street Improvements Project <ul style="list-style-type: none"> <li>• Clinton Avenue</li> </ul>	<ul style="list-style-type: none"> <li>• Permeable Pavers</li> <li>• Storm Sewer Reconstruction</li> </ul>
2019	2019 Drainage Improvements Project <ul style="list-style-type: none"> <li>• Y Street</li> <li>• South O Street</li> <li>• S Court and T Court</li> </ul>	<ul style="list-style-type: none"> <li>• Culvert Outlet Improvements</li> <li>• Bank Stabilization</li> <li>• Residential Detention Improvements</li> </ul>
2019	Emergency Storm Sewer Repairs – Norwalk Ready Mix	<ul style="list-style-type: none"> <li>• Storm Sewer Reconstruction</li> </ul>
2020	Downtown Streetscape Improvements	<ul style="list-style-type: none"> <li>• Pervious Pavers (design stage)</li> </ul>

# REVIEW OF PAST ACCOMPLISHMENTS

- Used knowledge from last four years.
- Stormwater Utility ERU Update
- Stormwater Master Plan
  - GIS Data Collection
  - Stormwater Modeling
  - Stream Assessments
  - Priority Projects

# REVIEW OF PAST ACCOMPLISHMENTS

- Equivalent Residential Unit (ERU) is key element of stormwater utility
- 1 ERU = 3,400 square feet of impervious area
- Measure impervious area of commercial, industrial, and multifamily greater than 2 units
- Count units for single family residential, duplexes, and townhomes
- Maximum of 200 ERU for School District and County

# STORMWATER UTILITY UPDATE

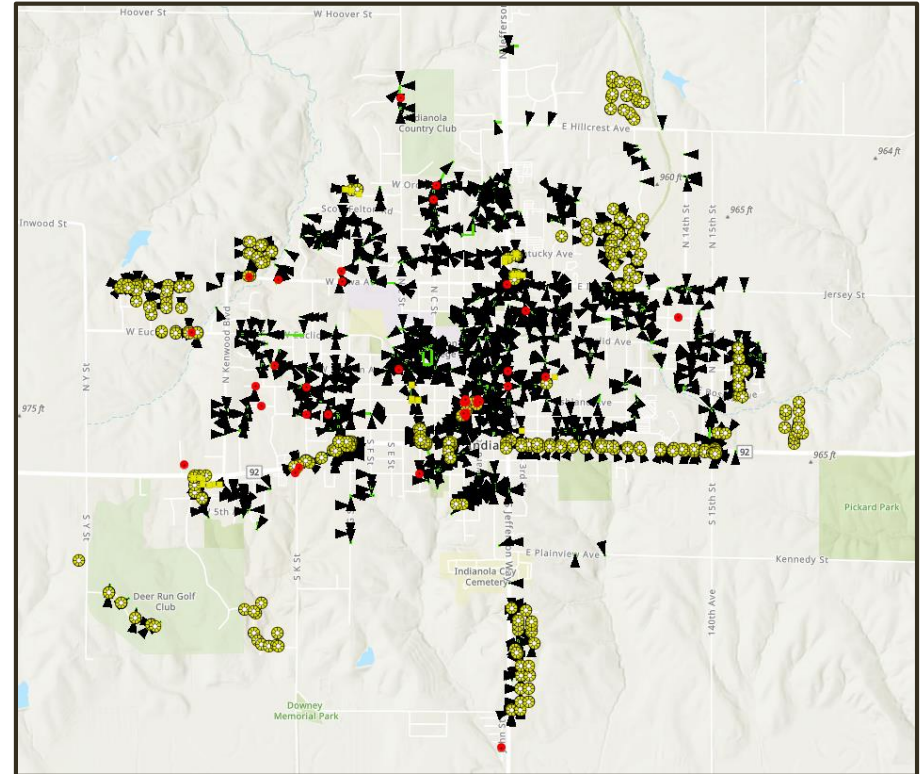
- Routine Audit – Budgeted expense in FY21 budget.
- Check impervious areas and parcel counts.
- Current Stormwater Utility Revenue = +/- \$200,000/year
- What we found - \$50,000/year of potential additional revenue at current rate.

# STORMWATER UTILITY UPDATE

- Next Steps
  - Review parcels with City Staff
  - Update revenue model based on review

# STORMWATER UTILITY UPDATE

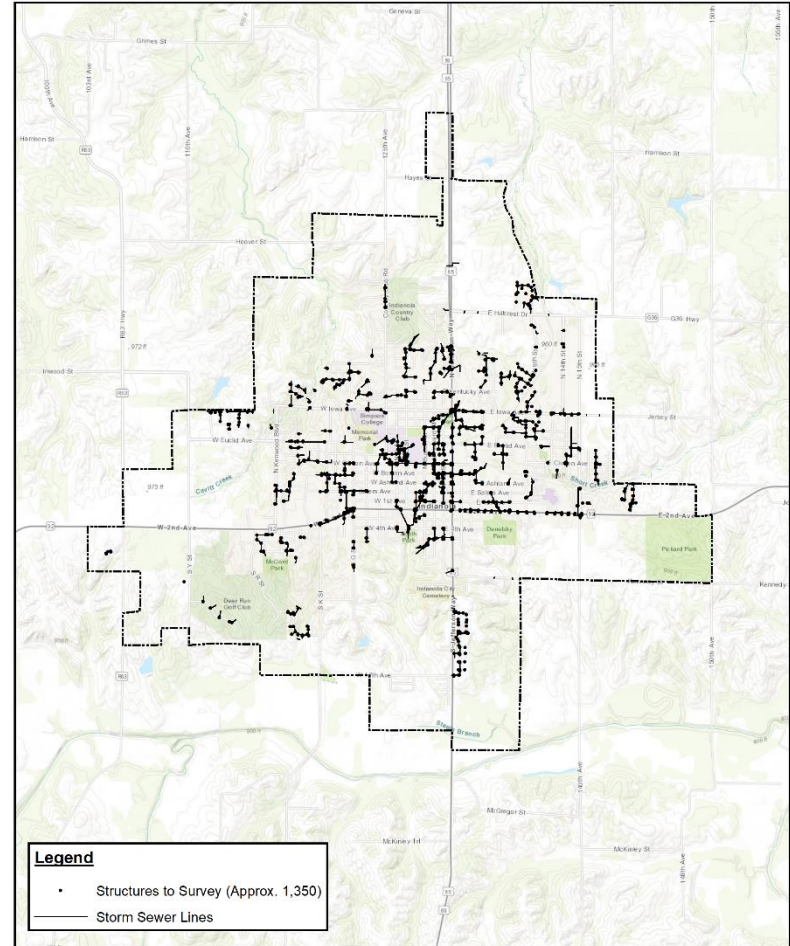
- Current GIS DATA
  - 350 Manhole Structures
  - 30 Intake Structures
  - 1,453 Storm Sewer Pipes



Indianola Master Utilities Online Data

# GIS DATA COLLECTION

- Proposed GIS DATA
  - Approximately 1,350 manholes and intakes
  - Could be more or less after field work complete



# GIS DATA COLLECTION

## Existing Beacon Attributes

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### GIS Data Collection Details

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**Gravity Main** - facility ID, install date, material, diameter, pipe type, year lined, liner type, downstream elevation, upstream elevation, slope, from manhole, to manhole, enabled, active flag, owned by, managed by, flow summary, last update date, and last editor.

**Manhole** - facility ID, install date, high pipe elevation, invert elevation, rim elevation, cover type, wall material, manhole type, manhole condition, location description, pavement cut depth, flow direction, lined, GPS date, enabled, active flag, owned by, managed by, flow summary, last update date, last editor.

**Inlet** - facility ID, install date, inlet type, access diameter, invert elevation, access material, access type, enabled, active flag, owned by, managed by, last update date, last editor, and ancillary.


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# GIS DATA COLLECTION

- Determine initial information fields needed in the system database

Hydraulic Data Existing Conditions (calibrated)														
Conduits														
Link	Nodes		Conduit Type	Dia. (ft)	Width (ft)	n	Slope (%)	Length (ft)	Inverts		Entrance Loss	Exit Loss	Cap. (cfs)	Description
	US	DS							US	DS				
L100	L100	N100	Circular	4.0	0.0	0.013	0.72	68.0	881.44	880.95	0.50	0.50	121.9	
L101	L101	N101	Circular	4.0	0.0	0.013	0.46	59.0	881.71	881.44	0.50	0.50	97.2	

- Storm water collection and conveyance focus on:
  - Type
  - Condition
  - Capacity/Changes Upstream


**STRUCTURE INSPECTION FORM**
Project No 116.0912

Crew WR Date 9/29/2016 Save

Structure\_ID 
Not Found ☐ Could Not Open ☐ Buried ☐

Type 
Private? ☐

Surface Cover 
Comments:

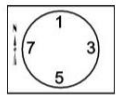
Depth (ft):

Cover Type

Grade to Rim Height (in)

Surcharge Evidence? ☐ Surcharge Depth (ft)

Silt or Debris Buildup? ☒ Silt or Debris Depth (ft)  0.1



**PIPE DATA**

	Pipe Shape	Width (in)	Height (in)	Dia. (in)	Pipe Material	Invert Depth (ft)	Flow Direction In/Out	Conn. MH #	Locate (1-8)
P-1	Rnd			15	RCP	4.15	In		1
P-2	Rnd			15	RCP	4.25	Out	95	5

# GIS DATA COLLECTION

- **Identify System Condition Indicators**

Reports generated from sewer investigation and survey of structures provide the ability to observe defects and determine the structural, erosional, and operational parameters that influence asset performance



- **Grade Impact of Defects Found**

A risk analysis must be performed on each of the issues discovered in order to grade severity based on likelihood of asset failure and the consequences of asset failure

- **Critical Asset & Rehabilitation Rating**

Detect critical infrastructure within project area and develop preliminary maintenance plan that ranks rehabilitation by significance of system integrity

# GIS DATA COLLECTION

## SUMMARY

- GIS Database Saves Time
- Provides a Higher Level of Customer Service
- Locate Critical Maintenance Issues
- Opportunity to Compare all Structures for Ease of Prioritizing

# GIS DATA COLLECTION

## Estimated Time and Expense Related to Field Survey and Data Processing

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### Stormwater Infrastructure GIS Survey

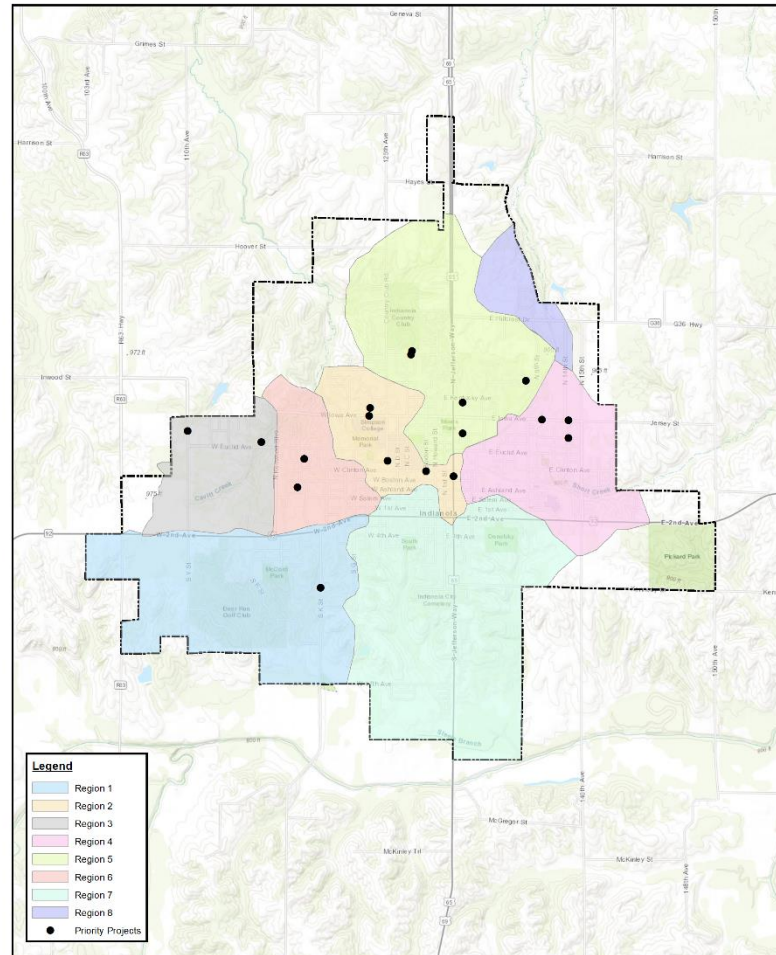
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Estimated Time to Complete Field Survey	55 days
Estimated Cost to Complete Field Survey	\$93,500
Estimated Time to Complete Data Processing	30 days
Estimated Cost to Complete Data Processing	\$24,000
<b>Total Cost</b>	<b>\$117,500</b>

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# GIS DATA COLLECTION

## Regional Modeling Areas



# STORMWATER MODELING

## SUMMARY

- Regional Watershed Approach
- Analyze the Impacts of Upstream Projects on Downstream Projects
- Understand Performance of the Entire System
- Key Subwatersheds

# STORMWATER MODELING

## Estimated Expense Related to Hydrologic and Hydraulic Modeling

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<b><u>Hydraulic Modeling Costs</u></b>	
Region 1	\$11,200
Region 2	\$15,000
Region 3	\$9,600
Region 4	\$13,400
Region 5	\$14,800
Region 6	\$11,900
Region 7	\$13,600
Region 8	\$9,600
<b>Total Cost</b>	<b>\$99,100</b>

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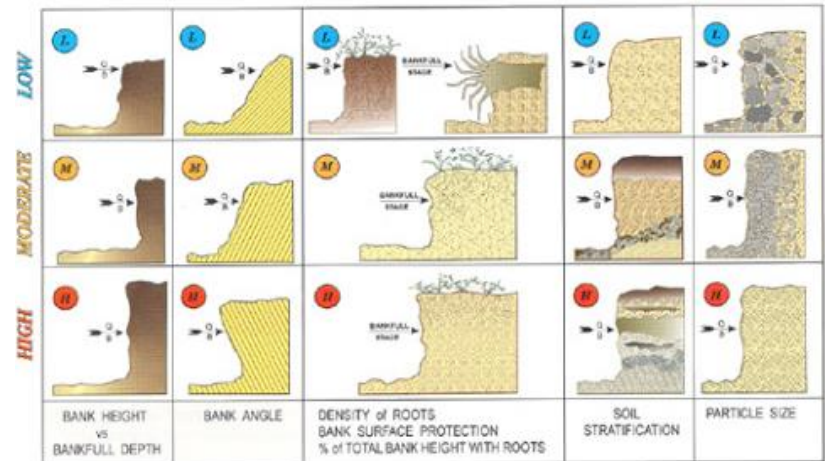
# STORMWATER MODELING

- 38% of concerns expressed to City staff related to open channel erosion.
- Impacts to Utilities and Buildings
- Address Easements and Access

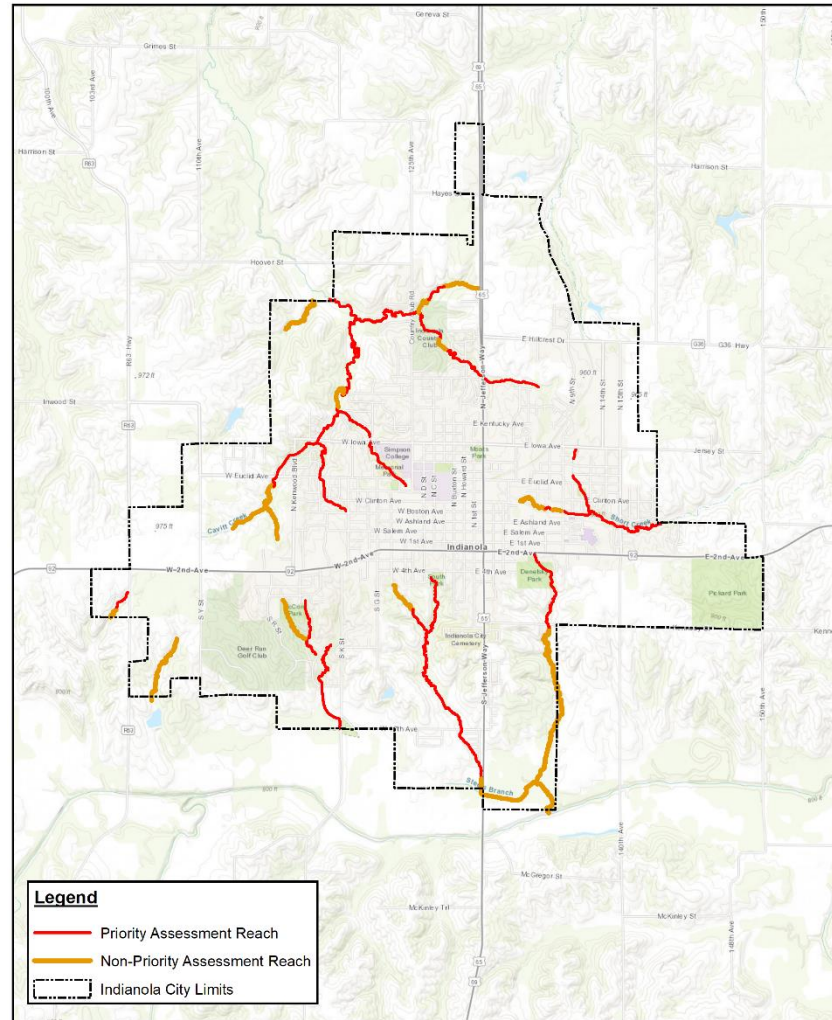


# STREAM ASSESSMENT

- Bank Erosion Hazard Index (BEHI)
- Preferred method of the Iowa Department of Natural Resources
- Assigns point values to several aspects of bank condition and provides an overall score (Low, High, Moderate)
  - Bank height: bankfull height
  - root height : bank height
  - Root density (%)
  - Bank angle (%)
  - Surface protection (%)



# STREAM ASSESSMENT



# STREAM ASSESSMENT

## SUMMARY

- Develop Database to Understand Entire System
- Ability to Prioritize and Budget Improvements
- Ability to be Consistent with Citizen Concerns

# STREAM ASSESSMENT

## Estimated Costs to Complete Stream Assessment for Two Options

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<b>Option</b>	<b>Cost Estimate</b>
Option 1 - 11 mile Stream Assessment	\$43,400
Option 2 - 17 mile Stream Assessment	\$60,100

# STREAM ASSESSMENT

- Projects identified through City staff and public input
- Working on Complaints
- Different types of projects
  - Streambank Stabilization
  - Storm Sewer Improvements
  - Culvert Replacements, etc.

# PRIORITY PROJECTS

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### PRIORITY 1: SOUTH K ST. CULVERT REPLACEMENT

**Project Location:** 1100 block of South K Street

**Modeling Region:** Region 1

**Reported Issue / Concern:** The City prefers the project occurs simultaneously to the planned paving project

**Observations / Review Notes:**

- Approximately 65 feet of 48 inch diameter pipe needs to be replaced under the existing gravel road
- Minimal modeling will be needed to verify the concept design
- Project schedule will align with the planned paving of South K street to occur in the next 1-2 years



#### Findings:

- The drainage area is approximately 22 acres (0.04 square miles)
- The estimated  $Q_{100}$  is 143 cfs
- From LiDAR, the roadway elevation is approximately 906.6
- Preliminary HY-8 modeling indicates that a 48 – 54 inch culvert may be needed at this location

**Recommendations:** Further hydrologic and hydraulic modeling is needed to finalize culvert design results

Item	Quantity	Units	Unit Price	Total
Survey	1	LS	\$3,000	\$3,000
Concept Design	1	LS	\$2,000	\$2,000
Design	1	LS	\$3,701	\$3,701
Construction	1	LS	\$24,675	\$24,675
<b>Total</b>				<b>\$33,376</b>

# PRIORITY PROJECTS

	TOTAL	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
1. GIS DATABASE	\$117,500											
1A. Field Survey		\$93,500										
1B. Data Processing		\$24,000										
2. STREAM ASSESSMENT	\$60,100											
2A. Assess Streams												
2B. Data Processing and Report Results			\$30,050	\$30,050								
3. REGIONAL MODELING	\$99,100											
3A. Region 1		\$11,200										
3B. Region 2			\$15,000									
3C. Region 3								\$9,600				
3D. Region 4								\$13,400				
3E. Region 5												
3F. Region 6												
3G. Region 7												
3H. Region 8												
4. PRIORITY CIP PROJECTS	\$6,019,336											
4A. South K St. Culvert Replacement	\$72,900											
4H-1. Concept & Survey		\$5,000										
4H-2. Design		\$18,700										
4H-3. Construction		\$49,200										
4B. Intersection of West Detroit Ave. and North E St. Pipe Damage	\$62,500											
4B-1. Concept & Survey			\$7,000									
4B-2. Design			\$10,200									
4B-3. Construction			\$45,300									
4C. Jefferson at Boston & Clinton - Drainage Improvements	\$885,336											
4C-1. Concept & Survey			\$13,500									
4C-2. Design			\$86,900									
4C-3. Construction				\$196,224	\$196,224	\$196,244	\$196,244					
4D. Sewer Improvements on 900 and 1000 block of North Y Street	\$105,600											
4D-1. Concept & Survey								\$7,000				
4D-2. Design								\$16,000				
4D-3. Construction								\$82,600				

# PRIORITY PROJECTS

- Next Steps
  - Finalize CIP worksheets for each projects
  - Finalize overall budget and schedule for the master plan

# PRIORITY PROJECTS

- 1.Stormwater Ordinance Update
- 2.GIS data collection - \$117,500
- 3.Hydrologic and Hydraulic Modeling - \$99,100
- 4.Stream assessment - \$60,100
- 5.Stormwater Structure Repair Program - \$50,000/Year
- 6.Priority projects - \$6 million
- 7.Develop CIP and update annually using additional studies
- 8.Conclude funding needs and sources

# STORMWATER SUMMARY

ISWEP Stormwater Utility Fee Survey		
2019		
Jurisdiction	Population	Single Family ERU
Bondurant	3,860	\$6.59
Pleasant Hill	10,064	\$3.00
Norwalk	11,517	\$7.50
Grimes	13,562	\$5.00
Altoona	14,541	\$5.00
Clive	15,447	\$7.83
Indianola	16,071	\$2.00
Johnston	17,278	\$6.05
Coralville	18,907	\$3.00
North Liberty	19,239	\$2.00
Waukee	22,810	\$6.00
Muscatine	22,886	\$12.40
Fort Dodge	24,098	\$5.15
Burlington	25,663	\$2.58
Urbandale	39,463	\$6.00
Marion	39,979	\$5.25
Ankeny	45,582	\$5.50
West Des Moines	66,641	\$5.45
Des Moines	203,433	\$13.44
Peer City Average		\$5.78
Statewide Average		\$4.57
Statewide 85%		\$6.00
Statewide 75%		\$5.04

# STORMWATER SUMMARY

- Current Funding - 28 years to complete CIP Program
- At \$5/ERU – 11 years to complete
- At \$6/ERU - 9 years to complete

# STORMWATER SUMMARY

# QUESTIONS?

# Contact Information

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